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ABSTRACT

This report explores the implementation of desktop publishing in the Minnesota Extension Service (MES) and provides a framework for its implementation in other organizations. The document begins with historical background on the development of desktop publishing. Criteria for deciding whether to purchase a desktop publishing system, advantages and drawbacks of desktop publishing, and ways that the integrity of institutional publications can be maintained are then listed. Five functions in extension work affected by desktop publishing are identified--word processing, advertising, bulletins and newsletters, distance education materials, and signs. Results of a survey of MES editorial staff that was designed to assess the impact of desktop publishing are discussed and a cost-benefit analysis is presented. Several benefits of desktop publishing are identified: lower production costs, quicker turnaround, more control, more flexibility, more capabilities, decentralization of production, and ease of alteration. Problems listed include: loss of quality control, fear of technology, increased pressure on staff, and lower productivity on start-up. The following recommendations for organizations considering desktop publishing are offered: (1) examine how the organization will have to change to accommodate desktop publishing; (2) conduct a cost-benefit analysis; and (3) be conscious of the quality of the items produced. Tables present survey response and cost-benefit data. (MES)

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MINNESOTA EXTENSION SERVICE
UNIVERSITY OF MINNESOTA
TELECOMMUNICATIONS DEVELOPMENT CENTER

TDC

TDC Research Report No. 6

July 1989

Desktop Publishing: Organizational Considerations for Adoption and Implementation

Paul Lee

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TDC was created within the Institute of Agriculture, Forestry, and Home Economics at the University of Minnesota in 1985 by a grant from the W.K. Kellogg Foundation. TDC, a research unit of the Minnesota Extension Service, is a resource center that encourages the use of existing and emerging technologies in the delivery of outreach education. TDC provides a wide array of programs and services including training, publication of resource materials, organizational consulting, and support of projects using innovative technologies in outreach education. The center offers a state-of-the-art technology demonstration laboratory (TechLab) for experimentation, demonstration, and hands-on production.

During 1988-89, TDC is supporting five staff-directed projects. The projects explore the use of satellite teleconferencing, low-cost interactive videodisc systems, CD-ROM (compact disc - read only memory), audiographics conferencing, and interactive television in the delivery of outreach education.

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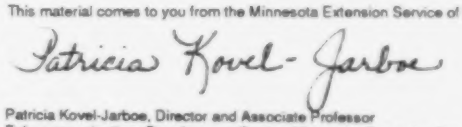

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University of Minnesota, U.S. Department of Agriculture, and Minnesota counties cooperating

A B O U T T H E T E C H N O L O G Y

The 'Art' of Desktop Publishing

A former journalism professor told me in the early 1980s that the proliferation of xerography (photocopying) technology could make virtually everyone a publisher. If that was true then, desktop publishing has the *potential* of making many individuals more sophisticated publishers today.

I've been working in journalism and graphic arts for 20 years as a teacher and practitioner. During part of that time, I was introduced to some of the new technology associated with those professions. The *evolution* of technology for print production was largely contained within businesses and institutions that could afford the costly technology.

However, desktop publishing is a *revolution* in that it places relatively low-cost technology, and the *potential* to create well-designed documents, in the hands of many people.

Some background in graphic design is essential to undertake quality desktop publishing. The design devices associated with traditional methods -- body type, headline type, photographs, art, and white space -- along with design principles -- balance, proportion, sequence, unity, and contrast -- must be included with desktop publishing. Desktop publishing practitioners with limited graphics background should acquire the skills through additional schooling or training.

There is an "art" to desktop publishing. As with other professional "artistic" endeavors, skills required to perfect it must be learned. And, even though a document may look good, the quality of a good publication continues to rest in the content.

This monograph was produced on desktop publishing using an IBM AT personal computer and an Apple LaserWriter printer. The software ued was PageMaker. "Expert" users of desktop publishing may see flaws in this document. The typical reader will likely not be aware of how the publication was put together. This document may represent all that is good (and possibly all that is not good) about desktop publishing.

Paul Lee
TDC communications director

Portions of this article were drawn from: Lee, P. (1987, September) Desktop Publishing: Using Innovative Technology to Help Communicate Better. TechNotes, No. 1. Telecommunications Development Center, Minnesota Extension Service, University of Minnesota.

Desktop Publishing: Organizational Considerations for Adoption and Implementation

Paul Lee*

ABSTRACT

Desktop publishing is viewed by some as a panacea for problems encountered in production of print materials, while others are uncertain of its benefits (or costs) to organizations. This monograph explores the adoption and implementation of the technology in the Minnesota Extension Service, University of Minnesota (and provides a framework for other organizations to follow). It is not a primer on desktop publishing, nor is it a hardware and software analysis.

Desktop publishing by editorial staff is the focus, and a cost-benefit analysis is presented. The study found real benefits for desktop publishing: lower production costs, quicker turnaround, more control, more flexibility, more capabilities, decentralization of production, and easy author's alterations. However, there are greater costs on a per project basis: increased salaries and fringe benefits, training, and equipment. Additional problems include possible loss of quality control, fear of technology, increased pressure on staff, and lower productivity during startup.

The study found that desktop publishing by editorial staff is not cost-beneficial for small (two-page) Extension publications, but that it is cost-beneficial for larger (12-page) publications. The study also identifies organizational changes that must be considered during adoption and implementation.

INTRODUCTION

Desktop publishing is viewed by some as a panacea for problems encountered in production of print materials. While desktop publishing can provide many useful functions such as shorter turnaround and greater technical control over documents, it is less clear what the technology's effect is on cost savings, changing responsibilities, and quality control.

In 1986, the Telecommunications Development Center (TDC), a research unit of the Minnesota Extension Service (MES), University of Minnesota, adopted desktop publishing as an educational *support* technology and began to evaluate its usefulness in Extension. Desktop publishing proved to be one of the most popular technologies in TechLab, the center's technology demonstration laboratory. In addition, TDC provided training to individuals from the education, nonprofit, and corporate sectors about this emerging technology, as well as to staff of the Educational Development System (EDS), Extension's campus-based unit that produces educational materials.

MES relies heavily on print material in the delivery of Extension education. Extension currently publishes and distributes over 1,800 publications, in addition to films, slide sets, videotapes, and computer software. EDS produces most of the publications with a staff of 13 writer/editors and five graphic designers.

Because of this reliance on print material, EDS began exploring in 1987 whether or not desktop publishing would solve existing production problems. TDC provided consultation, and also offered introductory and specialized, hands-on training for EDS staff during winter 1988.

The results of an information and technology needs assessment administered to MES county agents and staff in 1987 revealed strong county-based interest in desktop publishing. As part of the assessment, agents and staff were asked to rate six technologies (desktop publishing, facsimile machine, portable microcomputer, presentation graphics, mobile car phone, and voice mail) as to which would be most helpful in their jobs. Desktop publishing led the list with 81 percent.[1]

While a need to apply new technologies to print production in Extension has been established, just what impact desktop

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publishing will have on the Minnesota Extension Service, as well as other organizations, has yet to be determined.

BACKGROUND

In its five-year history, desktop publishing has revolutionized the production of print materials by placing relatively inexpensive technology into the hands of many people. The brief existence of this technology today is the culmination of centuries of innovation in publishing.

Since the development of spoken language, humans have sought ways to preserve thoughts and ideas, and to communicate them to others. Prehistoric man used cave drawings; Egyptians used hieroglyphics; and more contemporary societies used alphabets. The Chinese are credited with inventing printing (relief printing -- from raised surfaces) and the papermaking process, and they were the first to use movable type (woodcuts). However, the complexity of their written language -- consisting of tens of thousands of characters -- made expansion of movable type problematic.

History, however, has credited Johann Gutenberg of Mainz, Germany, with introducing movable type for printing manuscripts, including the famous Gutenberg Bible, in the middle of the fifteenth century. Meggs in *A History of Graphic Design* says that movable type was "the most important advancement in civilization after the creation of writing."[2]

But it wouldn't be until the nineteenth century and the Industrial Revolution that significant gains would be made in the printing process. The steam-driven printing press was patented in 1810. Daguerre presented his daguerreotype, a photographic print, in 1839. In 1868, the first typewriter was patented, and in 1886 Merganthaler introduced the Linotype, which could generate five lines of type per minute.

During the middle of the twentieth century, offset printing and phototypesetting rose in popularity. In 1939, xerography, a plain paper copying process, was patented by Chester F. Carlson. The memory typewriter was introduced in 1950.

Computerized phototypesetting in the 1960s significantly increased the speed and variety of typesetting capabilities, but this equipment remained prohibitively expensive for individuals and small operations. Smith, author of *Goodbye Gutenberg: The Newspaper Revolution of the 1980s*, says computerization of text joins writing and printing from movable type as the third significant transformation for humans to store information.[3]

During the 1970s, newspapers and other large print- and graphics-using companies began adopting electronic page makeup technology, but the early systems cost as much as a half million dollars. While the costs of typesetting and page makeup equipment continued to decline, it was still expensive for smaller applications.

However, the extraordinary expansion of microcomputers into offices and homes in the 1980s set the stage for significant changes in production of printed material. In 1985, the Aldus Corporation introduced PageMaker, the first desktop publishing software, which combined input (keyboard), production (computer), and output (xerography and laser technology). First versions of PageMaker were designed for Apple Macintosh, but subsequent versions became available for IBM and compatible personal computers. Other desktop publishing software packages were released later, including Xerox's Ventura Publisher. Software package costs range from under $200 to over $2,500 depending upon their capabilities.

Bove, Rhodes, and Thomas in the foreword of their book, *The Art of Desktop Publishing*, say: "The power of publishing has historically shaped our destiny.... The power of computing has only recently changed our lives.... Desktop publishing is another major step in the evolution of human productivity tools."[4]

WHAT IS DESKTOP PUBLISHING?

The term "desktop publishing" was coined by Paul Brainerd, president and founder of Aldus Corporation, developer of PageMaker. Tilden defines the technology:

(A) desktop publishing system comprises the equipment (hardware) and computer programs (software) that enable users to assemble with precision all the elements of a publication -- typography, line drawings, illustrations, charts, graphs, tints, photographs, etc. -- electronically on a computer screen rather than mechanically on a paste-up board, and then allow users either to produce a single master copy for printing or sufficient duplicate copies to meet a particular purpose.[5]

While the term was new when PageMaker was introduced in 1985, desktop publishing technology had been around for several years with more sophisticated and costly equipment. The transformation of that technology to microcomputers -- with some complete systems of microcomputer, software, and laser printer costing less than $10,000 -- revolutionized print production.

Investments in desktop publishing systems also vary according to system capabilities. A $10,000 system -- including computer, printer, and software -- can produce newsletters, small publications, and high quality in-house reports. By comparison, a $3,000 investment allows for multicolumn documents, simple newsletters, and posters, and a $5,000 system can produce newsletters and in-house reports. A $25,000 investment allows for newsletters with art and graphics; long, sophisticated reports; quality publications; and books.[6] However, desktop publishing is a rapidly evolving technology, and innovations -- especially with output technology -- can affect system costs.

Many businesses and institutions have adopted desktop publishing to make their documents better looking, and to do more production work in-house. Typeset documents can be read faster; are viewed as more credible, persuasive, and professional; and take up less space.[7] For educational institutions, Wisanchuk has identified four criteria to determine whether or not to purchase desktop publishing systems. He says the investment would be wise if the organization:

1. requires the intermixing of graphics and text;
2. needs editing from time to time to update;
3. has a defensible need for high quality text; and

4. issues a template-type publication (i.e., a publication that has a more-or-less constant structure and layout, but content that changes from time to time).[8]

Those with a more optimistic view of desktop publishing tout the benefits of the technology. Erickson lists five advantages of desktop publishing:

1. Shorter turnaround: the ability to do more in less time.
2. Reduced costs: investments can be recovered in 1-3 years.
3. More control: publications can be manipulated more, and copy can be changed (and improved) later in cycle.
4. More capability: lower production costs and easier production-allow more enhancement of the publications.
5. More fun: people enjoy working with desktop publishing.[9]

McDonald challenges many of the claims desktop publishing proponents make:

Claim 1: Desktop publishing is state-of-the-art. *Some programs have limited functions, and laser print is uneven and less clear than typeset quality.*
Claim 2: Desktop publishing saves time. *Desktop publishing does provide for quicker turnaround, but for non-publications offices training and additional duties take more time.*
Claim 3: Desktop publishing cuts costs. *After the initial investment, there are costs of operating the technology. There is a quality tradeoff and hidden costs of time and effort.*
Claim 4: Desktop publishing is easy. *While the mechanics of desktop publishing may be easy (user friendly), publishing is not. Professionals make it look easy.*
Claim 5: Desktop publishing produced publications of high quality. *Desktop publishing is a tool. Content of a publications is what determines quality.*[10]

Proponents and skeptics alike share some concerns about desktop publishing, including loss of quality control by publications offices, and excessive author's alternations because of the ease with which they can be made. Desktop publishing technology in the hands of largely untrained staff can detract from publication style and standards that publications offices have tried to establish, and remote sites can now completely bypass these centralized offices. Drake suggests four ways that central publications offices can maintain the integrity of institutional identity:

1. Provide templates (standard formats) to create publications (includes type, margins, etc.)
2. Publish a thorough style manual.
3. Provide seminars (especially design seminars).
4. Provide constant consultation to remote offices.[11]

And, if desktop publishing is in the publications office, author's alterations need to be controlled systematically.

If in fact desktop publishing saves money, Drake suggests the savings be channeled toward more production staff. In addition, existing staff may have different roles and responsibilities. Drake says:

Desktop also changes the skills a publications office needs. Most of the managers I spoke with have cross-trained staff and reshuffled job descriptions to cope. Roles tend to get fuzzy with desktop because the discrete phases of traditional publishing methods -- editing, typesetting, layout, and pasteup -- blur together.[12]

If editorial staff undertake desktop publishing, their traditional role (writing and editing) changes to include typesetting and design. While this may initially seem more efficient, there are several concerns. First, just one person may be involved between writing and printing. Under more traditional methods of production, several other people -- typesetters, proofreaders, designers, etc. -- are involved in the process. These roles have served vital purposes such as double-checking. Are they now to be discarded or assimilated into a single individual? Felici and Nace say the publishing process -- writing, editorial, design, typesetting, graphics, pasteup, printing, etc. -- is linear, and that subsequent stages rely on the success of previous stages.[13]

Second, if editorial staff retain the traditional duties and at the same time take on new duties, they become less productive with purely editorial functions and much less productive during startup. And finally, these new responsibilities for editorial staff require training. Wisanchuk writes:

Anyone considering involvement in desktop publishing must be prepared to invest many person-hours in learning time, both in familiarization with the equipment and the software (both of which require considerable investment, with the software probably requiring at least as much time as the hardware) and with principles of graphic design, typography, and layout.[14]

EXTENSION WORK AND THE EDUCATIONAL DEVELOPMENT SYSTEM

Because the delivery of Extension education is print-dominated, desktop publishing becomes the tool for editorial and graphics staff. Several models for implementation of desktop publishing have emerged. Desktop publishing can be used primarily by: 1) graphic designers, 2) writer/editors, 3) other staff (clerical or special technicians), or 4) a combination of these. The Cooperative Extension Service in North Dakota has adopted the first model: only graphic artists use desktop publishing. The Minnesota Extension Service has adopted a combination of 1 and 2, although the graphics staff has yet to fully implement desktop publishing. Cornell University in New York has hired a new class of "electronic publications specialists" to do much of the desktop publishing work.[15]

Wisanchuk has identified five functions in Extension work that will be affected by desktop publishing:

1. Word processing -- desktop will generate more typeset-looking publications.
2. Advertising -- brochures and advertising will be camera ready.

3. Bulletins, fact-sheets, and newsletters -- these and journals, monographs, and books will look more professional.
4. Distance education materials -- can be updated and produced more often and less expensively.
5. Signs -- for meetings and workshops.[16]

Because of the pervasive use of print communications, the MES information system leader and others in EDS explored whether desktop publishing should be employed in the organization. The information system leader, an EDS staff member, took the following criteria under consideration:

1. Based on desktop publishing research, EDS leaders determined that there was an application for the technology in EDS. A survey of other state extension services was undertaken.
2. A number of Extension publications follow similar formats. Desktop publishing was viewed as a tool for speeding up the turnaround time for these publications.
3. Most Extension publications combine text and graphics. Both editors and artists were already using computers to generate text and graphics. A page layout program could combine these functions.
4. The university's printing department had no plans in 1987 to enter the desktop publishing arena, so EDS would have to work independently.
5. Few economical resources were available for EDS to contract for desktop publishing services.
6. EDS was the logical location in the organization for desktop publishing because of EDS's expertise in print production.
7. A competent desktop publishing manager was essential for coordinating these activates.[17]

A desktop publishing product manager was named in 1987 and, working in conjunction with the information system leader, recommended the adoption of a desktop publishing system which today includes: two IBM PC or compatible computers with full-page monitors, one Apple Macintosh, PageMaker software, and one Apple LaserWriter printer. MES functions in an IBM-PC (and compatible) environment having decided in the early 1980s to support that computer throughout the organization. PageMaker was selected because of its page-orientation features which are compatible with Extension publication demands.

The information system leader requested that TDC provide training to EDS because of TDC's early adoption of the technology and its expertise in use and training. In February and March 1988, two levels of training were provided: introductory

Table 1.
Survey of EDS Writer/Editors

How long have you worked in publications?

15.8 years (mean); range 7-20 years

How long have you worked with the Minnesota Extension Service?

7.8 years (mean); 2 years (median); 1 year (mode); range 1-20 years

How many hours per week are you actively working on projects. (It is unlikely to be 40 hours because of breaks, meeting, etc.)

27 hours (mean); range 24-33 hours

List what you think are the top three factors that have contributed to the *adoption* of desktop publishing in EDS.

Rank	
1	Cost savings
2	Quicker turnaround
3	Design efficiencies
4	Greater control
4	Mystique
4	Early adopters on staff
4	Interest in technology

Source: Based on a survey of production editors in Educational Development System (EDS).

List what you think are the top three *barriers* to the adoption of desktop publishing in EDS.

Rank	
1	Hardware/software shortage
2	Little training/learning time
2	Staff resistance
2	Additional production time
5	Decentralization
5	Little support/maintenance
5	Existing workload

Rank in order (1, 2, etc.) what you consider the primary *benefits* of desktop publishing.

		Mean
More control of projects		1.2
Quicker turnaround		1.3
More flexibility		2.5
Others:	Author's alterations	
	Cost savings	
	Enhanced graphics	

Rank in order (1, 2, etc.) what you consider the primary *negatives* of desktop publishing.

		Mean
More pressure on staff		1.4
Loss of quality control		2.0
Decentralization		2.3
Others	Less flexibility	
	Slower turnaround	
	Unrealistic expectations	
	Changing role of editors	

training (approximately 25 people, including writer/editors, graphic designers, supervisors, and support staff) and specialized, hands-on training (approximately 10 people, just for those who would operate the system). While TDC provided this training at no cost, training organizations often charge $300 per day for desktop publishing training.

To assess the impact of desktop publishing in EDS, a survey was conducted among editorial staff only in May 1989 because graphic designers have yet to fully adopt desktop publishing. This monograph assesses the impact of desktop publishing only among those with editorial responsibilities. The following assumptions are explicit: 1) Writer/editors have no slack time;2) EDS graphic designers are working on other projects; 3) outside vendors (i.e., university printing department) are used for typesetting, layout, and design; and 4) real dollars are expended.

Responding to the survey were writer/editors who classified themselves in a range from "expert user" to "non user" of desktop publishing. Writer/editors have a mean of 15.8 years work in publications, with 7.8 years work in EDS. (However, the median for EDS writer/editors responding to the survey is 2 years, and the mode is 1 year.) Writer/editors devote 27 hours per week to projects, out of a 40-hour week. (See Table 1.)

Writer/editors said cost savings was the top factor for *adoption* of desktop publishing, followed by quicker turnaround, and design efficiencies. The greatest *barriers* were hardware and software shortages, followed by limited training and learning time, staff resistance, and additional production time requirements. The writer/editors have "often" or "seldom" used computers for their work before desktop publishing, and most have accepted the inevitability of technology in their work. More control over projects, followed closely by quicker turnaround, was the leading *benefit* of desktop publishing, according to EDS

Table 2.
Estimates of Clock and Calendar Time Devoted to Projects for Writer/Editors Before Desktop Publishing

	Hours/ 2-Page	Hours/ 12-Page	Weeks/ Timeline
Planning	2.1	2.9	.2
Receive project			
Examine work to be done			
Create plan of work			
Meet with designer			
Obtain cost estimates			
Editing	3.3	8.0	.8
Edit copy			
Meet with content specialist			
Production: Typesetting	2.3	6.0	2.0
Markup copy			
Send copy for typesetting			
Proofread			
Send copy for corrections			
Check corrections/changes			
Production: Layout	2.5	5.7	2.0
Prepare dummy			
Send for pasteup			
Review layout			
Meet with content specialist			
Return layout for changes			
Final review of layout			
Production: Printing	2.0	3.3	2.0
Send for camera work			
Review silverprint			
Send for printing			
EDS paper work			
Total	12.2	25.9	7.0

Source: Based on a survey of production editors in Educational Development System (EDS).

Table 3.
Estimates of Clock and Calendar Time Devoted to Projects for Writer/Editor/Designers After Desktop Publishing

	Hours/ 2-Page	Hours/ 12-Page	Weeks/ Timeline
Planning	2.5	3.0	.2
Receive project			
Examine work to be done			
Create Plan of work			
Obtain cost estimates			
Editing	3.7	8.0	.8
Edit copy			
Meet with content specialist			
Production: Desktop Publishing	4.3	10.0	.8
Design thumbnail sketches			
Prepare format on DTP			
Prepare layout on DTP			
Meet with content specialist			
Production: Review	2.5	4.7	.2
Review layout			
Make changes in layout			
Final review of layout			
Proofread			
Production: Printing	2.0	3.3	2.0
Send for camera work			
Review silverprint			
Send for printing			
EDS paper work			
Total	15.0	29.0	4.0

Source: Based on survey of production editors in Educational Development System (EDS) who classified themselves as "expert user" or "average user" of desktop publishing.

staff. More pressure on staff was viewed as the most *negative* aspect of desktop publishing. Interestingly, loss of quality control was ranked a distant second.

Prior to the adoption of desktop publishing, the roles of EDS writer/editors and graphic designers were fairly well-defined. (The two groups are organized in separate administrative groups.) Writer/editors did front-end work (writing and editing), with their design work largely limited to "dummy" preparation. (Table 2 lists the functions of writer/editors.) Requisite skills include journalism and grammar. Graphic designers did mostly middle range work (layout and design), with keylining (the preparation of layouts) the predominant activity, and virtually no editing. Skills included graphic and design capabilities. It was assumed that after the adoption of desktop publishing in EDS, the role of writer/editors would change more than that of graphic designers. That is, writer/editors would adopt more responsibilities for design functions than graphic designers would for editorial functions.

As a result of desktop publishing, the role of designer has been added to the responsibilities of writer/editors. The work now includes both front-end *and* middle-range activities. Chief functions are editorial *and* design. (Table 3 lists the responsibilities of writer/editor/designers.) And, requisite skills now include journalism, grammar, graphics, *and* design.

Under traditional methods, writer/editors estimate they devote 12.2 hours to a typical two-page publication and 25.9 hours to a typical 12-page publication. (See Table 2 and Table 3.) With desktop publishing, writers/editors devote 15.0 hours to a two-page publication and 29.0 hours to a 12-page publication. While the addition of only 3 hours on a 12-page publication may be questioned by some, time savings are realized during dummy preparation and proofreading when desktop publishing is used.

The real savings appear to come in calendar time. With traditional methods, a typical publication can take up to seven weeks to move through the university's publishing process. With desktop publishing, a typical publication can be completed in four weeks or less. And, the deadlines for a few "high priority" projects have been met in less than a week.

COST-BENEFITS OF DESKTOP PUBLISHING

One of the most prevalent claims made for desktop publishing is that it will reduce production costs, and that the savings can be directed to more projects, more elaborate projects, and more staff. Bove, Rhodes, and Thomas say, "It has become cost-effective for almost anyone using a personal computer to prepare documents that appear professionally published."[18] The costs and benefits of desktop publishing are still being debated. A cost-benefit analysis of desktop must take into consideration all the costs as well as all the benefits. It might be expected that desktop publishing would be more cost-beneficial for graphic designers because it replaces current duties, but that it may be less cost-beneficial for writer/editors because it adds some new duties.

For graphic designers, Arcellana has demonstrated that

Table 4
Cost-Benefit of Some Types of Publications

Advertising brochure
Specifications: 8 pages, 8-1/2 x 11 inches, 5 duotones per page average, 2 spot colors.

Traditional		Desktop	
Design (4 hrs @ $35/hr)	$140	Design (4 hrs @ $35/hr)	$140
Typesetting	$140	Typesetting	$105
Pasteup and production (12 hrs @ $22/hr)	$264	Pasteup and production (12 hrs @ $22/hr)	$264
Duotones	$400	Duotones	$400
Line art	$ 8	Line art	$ 8
Total	**$952**	**Total**	**$917**

Events calendar
Specifications: 28 pages, 11 x 17 inches, 1 halftone per page average, 1 spot color.

Traditional		Desktop	
Design (6 hrs @ $35/hr)	$ 210	Design (6 hrs @ $35/hr)	$ 210
Typesetting	$2500	Typesetting text	$ 500
		Typesetting display type	$ 528
Pasteup and production (45 hours @ $22/hr)	$ 990	Pasteup and production (25 hrs @ $22/hr)	$ 550
Halftones	$ 130	Halftones*	$2530
Line art	$ 24	Line art	$ 704
Total	**$3854**	**Total**	**$5022**

* Halftones and line art were produced with a desktop illustration program. If traditional methods were used, the cost would be the same as under "Traditional."

Booklet
Specifications: 20 pages plus covers, 8-1/2 x 11 inches, no halftones, 1 spot color.

Traditional		Desktop	
Design (5 hrs @ $35/hr)	$ 175	Design (5 hrs @ $35/hr)	$ 175
Typesetting	$1100	Typesetting	$ 338
Pasteup and production (35 hrs @ $22/hr)	$ 770	Pasteup and production (25 hrs @ $22/hr)	$ 550
Line art	$ 85	Line art	$ 85
Total	**$2130**	**Total**	**$1148**

Catalog
Specifications: 72 pages plus covers, 8-1/2 x 11 inches, 4 halftones per page average, 1 spot color.

Traditional		Desktop	
Design (4 hrs @ $35/hr)	$ 140	Design (4 hrs @ $35/hr)	$ 140
Typesetting	$2160	Typesetting	$ 938
Pasteup and production (80 hrs @ $22/hr)	$1760	Pasteup and production (50 hrs @ $22/hr)	$1100
Halftones	$ 400	Halftones	$ 400
Line art	$ 40	Line art	$ 40
Total	**$4500**	**Total**	**$2618**

Source: Arcellana, J.E. (1988, October) Is Desktop Publishing Worth It? Macworld 5(11), pp. 107-115.

Table 5.
Cost-Benefit Analysis of Extension Publications (Per Publication)

	I. 2-Page Publications		II. 12-Page Publications		III. 2- and 12-Page Publications	
	Before DTP	After DTP	Before DTP	After DTP	Before DTP	After DTP
Benefits						
Quicker turnaround of projects	0	+	0	+	0	+
More control over projects	0	+	0	+	0	+
More flexibility with projects	0	+	0	+	0	+
Decentralization of production	0	+	0	+	0	+
More capabilities	0	+	0	+	0	+
Easy to make author's alterations	0	+	0	+	0	+
Total benefits	0	+	0	+	0	+
Costs						
Possible loss of quality control through inexperience	0	-	0	-	0	-
Fear of technology (technophobia)	?	-	?	-	?	-
Increased pressure on staff	?	-	?	-	?	-
Lower productivity during startup	?	-	?	-	?	-
Production costs	$240	$ 90	$1505	$ 800	$646	$330
Salary and fringe benefits	$198	$243	$ 420	$ 470	$269	$320
Training	?	$ 3	?	$ 6	?	$ 4
Equipment	?	$ 37	?	$ 71	?	$ 49
Total costs	$438	$373	$1925	$1347	$915	$703
Number of projects able to complete	111	90	52	47	81	68
Addition cost to equal projects		$ 86		$ 148		$134
Grand total costs	**$438**	**$459**	**$1925**	**$1495**	**$915**	**$837**

Introduction: Table 5 presents a cost-benefit analysis of writer/editors doing desktop publishing under three conditions: editors producing: 1) only two-page publications, 2) only 12-page publications, and 3) two- and 12-page publications with their time equally divided between the two. The left-most column lists the benefits and costs attributed to desktop publishing.

Assumptions: Writer/editors have no slack time; they spend all their production hours in editorial functions. Graphic designers are busy working on other projects. Writer/editors use outside sources (i.e., University of Minnesota Printing Department) for typesetting, keylining, and printing rather than in-house (EDS) sources before the adoption of desktop publishing. Real dollars are expended. It is also expected that desktop publishing will be more cost-beneficial for graphic artists than for editorial staff because the technology replaces existing duties for the graphics staff. However, this cost-benefit analysis explores only the editorial staff functions.

Benefits: The benefits of desktop publishing listed are difficult to place in monetary terms. The 0 (zero) listed under "Before DTP" indicates that there is no benefit. The + (plus) under "After DTP" indicates that there is a benefit, but that no dollar figure can be applied. One benefit missing is lower production costs. Production costs are included under "Costs" and are not listed under "Benefits" to avoid double counting.

Costs: Three costs (possible loss of quality control, fear of technology, and increased pressure on staff) are difficult to place in monetary terms. "Lower productivity during startup" could be measured in monetary terms, but was not undertaken in this study. The 0 (zero) means no cost, the ? (question mark) questions whether there is a cost, and the - (minus sign) indicates that there is a cost, but that no dollar figure can be applied.

Production costs: These costs for "2-Page Publication" and "12-Page Publication" are provided by the University of Minnesota Printing Department. (See Table 6.) The "Before DTP" cost includes typesetting, keylining, and printing costs. The "After DTP" includes only printing costs because desktop publishing produces "camera ready" copy. The costs for "2- and 12-Page Publications" were extrapolated by a formula that was based on half of the time producing 2-page and half producing 12-page publications.

Salary and fringe benefits: The salary was based on the median salary of $27,000 for an Editor III, which is the classification for most individuals working on desktop publishing in EDS. The fringe benefits was based on 25 percent of salary ($6,750) for a total of $33,750. Over 40 hours, the hourly rate is $16.20. This hourly rate was taken times the number of hours per 2-page and 12-page publications (See Table 2 and Table 3.)

Training: While no training costs were charged by TDC, an organization may have to purchase training. Several training services provide one-day introductory and two-day advanced training for about $300 per day per person. Total training costs were placed at $900. It was assumed that an Editor III may remain in the job for three years, for an average of $300 per years. That figure was divided by the expected number of projects completed per year to determine training costs per project.

Equipment: Equipment costs were based on an investment of $10,000 per person. (Per person equipment costs can vary widely depending upon initial investment and the number of staff using equipment.) It was assumed that equipment would have a useful life of three years before becoming obsolete, so the annual equipment cost per person is $3,333. That figure was divided by the number of projects completed per year to come up with the equipment cost.

Number of projects able to complete: Because editorial staff are spending more hours per project, they complete fewer projects per year.

Additional costs: These include additional production, salary and fringe benefits, training, and equipment costs to raise "After DTP" projects completed to the same number as "Before DTP." A factor was used to determine these costs: .23 for 2-page, .11 for 12-page, and .19 for the combined group.

Grand total costs: This represents all the costs including those for equalizing projection levels. It is this line for which the cost-benefit of desktop publishing will be determined.

desktop publishing is cost-beneficial for some applications. (See Table 4.) Arcellana obtained production estimates on four projects from professional graphic firms for production under traditional and desktop publishing methods.[19] The author found that a 20-page booklet and a 72-page catalog were cost-beneficial with desktop publishing by a margin of almost 2-to-1. But, the author also found that an 8-page advertising brochure with little type was marginally cost-beneficial. This seems to suggest that larger publications with greater type demands are more cost-beneficial. A 28-page events calendar with halftones and line art produced with a desktop illustration program was not cost-beneficial for desktop publishing. However, if the halftones and line art were produced with traditional methods, desktop publishing becomes cost-beneficial.

A cost-benefit analysis of MES writer/editors doing desktop publication was undertaken using a framework suggested by Levin.[20] Levin's model uses an "ingredients" approach which lists all the benefits and costs, and the monetary figures (when possible) associated with them. Table 5 shows a cost-benefit analysis for EDS under three conditions: 1) Writer/editors producing *only* two-page publications (I.). 2) Writer/editors producing *only* 12-page publications (II.). 3) Writer/editors equally dividing their time *between* two-page and 12-page publications (III.). The figures in Table 5 are on a per item basis (i.e., the total benefits and costs for one publication under those conditions). The publications on which the writer/editors based their estimates contained mostly type and few graphic elements, typical of many Extension publications.

The benefits of desktop publishing are more difficult to place in monetary terms than are the costs. Benefits include: quicker turnaround, more control, more flexibility (e.g., changing column widths and typestyles), decentralization, more capabilities (e.g., more elaborate publications), and easy author's alterations. One "benefit" more easily put in monetary terms is lower production costs (i.e., savings on typesetting and design). However, that is considered a cost and is appropriately place under "Costs."

Some of the costs are also difficult to place in monetary terms, while others can be done easily. Some of the costs that are problematic include: possible loss of quality control, fear of technology, and increased pressure on staff. Lower productivity during startup could be monitored, but that was not undertaken in this study. Monetary costs can be arrived at for production costs, salary and fringe benefits, training, and equipment.

Table 5 shows that desktop publishing is not cost-beneficial for writer/editors producing *only* two-page publications. The production cost savings ($150) does not sufficiently offset additional salary and fringe benefits, training, and equipment costs associated with desktop publishing. However, for writer/editors producing *only* 12-page publications or devoting their time equally *between* two-page and 12-page publications, desktop publishing is cost-beneficial.

Typesetting accounts for the greatest savings, and larger publications may have more typesetting costs. Table 6 presents the production cost breakdowns for two-page and 12-page publications. The table shows that typesetting is a significant cost under traditional methods of production, and that desktop publishing can generate significant savings in typesetting costs, as well as with keylining.

EDS was realizing some typesetting savings under traditional methods by supplying the university's printing department with text on a floppy disk rather than paper copy. This method was used infrequently as it was somewhat cumbersome for both EDS and the printing department.

CONCLUSIONS AND RECOMMENDATIONS

For writer/editors producing larger publications (more than two-page), desktop publishing is cost-beneficial. However, even for smaller publications the benefits of quicker turnaround, more control over projects, and other benefits, may be so great that the monetary costs associated with desktop publishing may be secondary.

In addition to monetary benefits and costs, desktop publishing affects the roles and responsibilities of staff. Change in organizations can be difficult, and there are certainly barriers to overcome. Some staff suffer from "technophobia" (fear of technology), while others may see technology as a threat to their employment.

The benefits of desktop publishing are attractive. But, many individuals underestimate the real costs of desktop publishing, or are unaware of hidden costs. Organizations will have to decide whether the benefits are greater than the costs, both monetary and social.

For small organizations with minimal production requirements, the decision may be whether or not to adopt desktop publishing. The technology could prove to be albatross for small organizations, strapping funds and employee time. For larger organization with maximum production requirements, the decision may be not whether to adopt the technology but how to

Table 6.

Production Cost Estimates for 2-Page Publications

	Before DTP (trad.)	Disk furnished to printer	After DTP
Typesetting	$125	$ 85	$ 0
Keylining	$ 25	$ 25	$ 0
Printing	$ 90	$ 90	$ 90
Total	**$240**	**$200**	**$ 90**

Production Cost Estimates for 12-Page Publications

Typesetting	$ 570	$ 425	$ 0
Keylining	$ 135	$ 135	$ 0
Printing	$ 800	$ 800	$800
Total	**$1505**	**$1360**	**$800**

Specifications: 2,000 copies, 2- or 12-page publications, 8-1/2 x 11 inches, 60-lb. gray offset, black ink, saddle stitch (12-page), silverprint (12-page).

Source: University of Minnesota Printing Department estimates.

implement it. Change in the organization because of desktop publishing may be the rule and not the exception.

For organizations considering desktop publishing, the following recommendations are offered:

1. Examine how the organization will have to change to accommodate desktop publishing. Is the time being saved that of the editorial/graphics staff or of outside vendors?
2. Conduct a cost-benefit analysis of desktop publication in the organization. Try to find the hidden costs. Do the benefits outweigh the costs (monetary, social, and human)?
3. Be conscious of quality of production. In a large organization, an extensive standards manual and a desktop publishing manager may be required.

In its final report to EDS leaders, a committee studying desktop publishing made these observation:

1. EDS must now provide additional space, equipment, training, overhead, and management of technology previously provided by other units (i.e., university printing department, vendors, etc.). This is a shift in resources and must be considered when assessing costs.
2. Writer/editors are now doing graphics work (on desktop publishing) in addition to editorial functions. Accordingly, fewer projects are able to be completed.
3. Graphic artists, who previously controlled the visual presentation of publications, now have limited control. This has marketing implications.
4. Desktop publishing neophytes experience a loss in productivity as they learn desktop publishing.
5. The perception of most EDS clients is that desktop publishing will provide economical products in less time. The technology raised concerns about quality and productivity.[21]

The committee also made a list of recommendations to EDS leaders regarding implementation of desktop publishing:

1. Definition and use of desktop publishing. What is it, and which projects and by whom should it be applied.
2. Staffing. To include designers, technicians, and a desktop manager, as well as a user/support group.
3. Equipment. More equipment and more powerful equipment is required.
4. Training. More extensive training is required.
5. Support for counties. WordPerfect 5.0 should be the desktop publishing software for county offices (This is the word processing software supported by Extension. The advanced capabilities of this version were deemed sufficient for county office needs. A few of the larger county offices have adopted PageMaker.)
6. Templates and style manuals should be prepared for desktop publishing at all levels.[22]

RECOMMENDATIONS FOR FUTURE RESEARCH

This assessment of desktop publishing was based on *only* editorial staff doing *only* two-page and 12-page publications. Desktop publishing may be more cost-beneficial for graphics staff because of the nature of their work. More work needs to be done on the cost-benefits of desktop publishing under both conditions, and with a wider variety of applications. The research should include *actual* costs of time and money rather than *estimated* costs.

More research needs to be done on the impact of desktop publication on organizational structure and on individuals. While the organization may benefit from desktop publishing, consideration should also be given to the impact on individuals.

And, more research should be done on maintaining quality control of production after the adoption of desktop publishing by organizations. Research should focus on which components (e.g., desktop manager, templates, standards manuals, etc.) contribute more to greater quality control.

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